ENERGY

Antimony: The Most Important Mineral You Never Heard Of

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Transparent or opaque? These are crystals of the antimony ore stibnite (antimony sulphide). UNIVERSAL IMAGES GROUP VIA GETTY IMAGES

Many readers have likely never heard of antimony, but it is important to their lives nevertheless. In fact, were it not for antimony produced here in the United States, the outcome of World War II might have turned out differently.

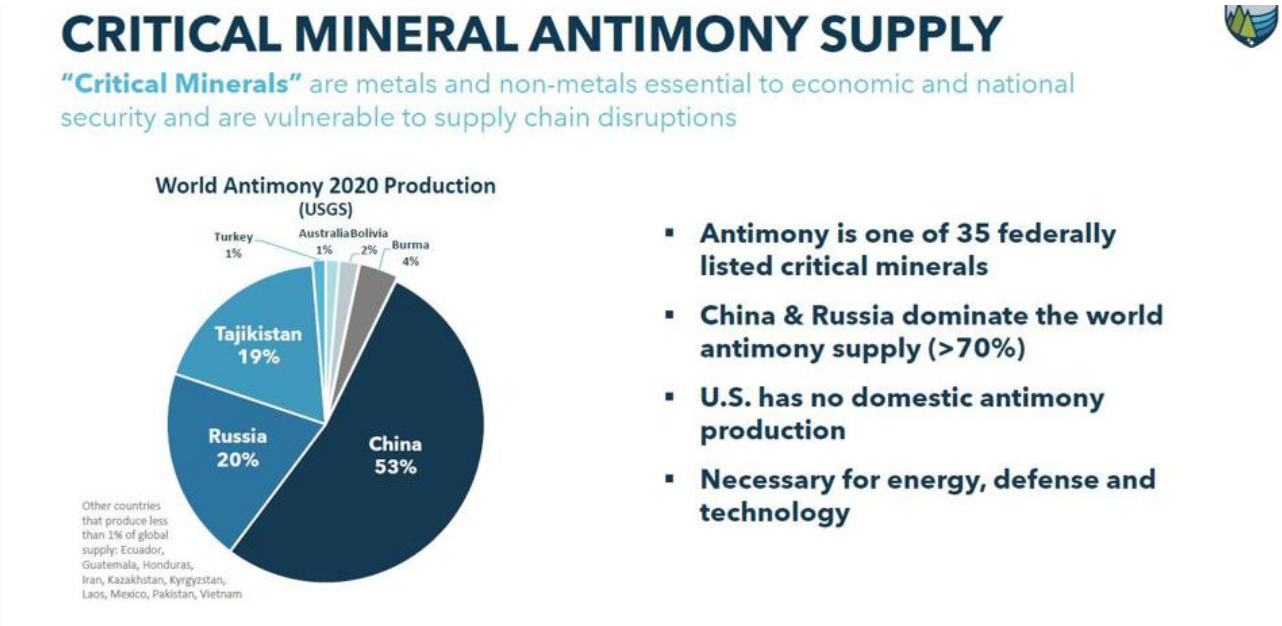
No, really, it could have. Antimony is a strategic critical mineral that is used in all manner of military applications, including the manufacture of armor

piercing bullets, night vision goggles, infrared sensors, precision optics, laser sighting, explosive formulations, hardened lead for bullets and shrapnel, ammunition primers, tracer ammunition, nuclear weapons and production, tritium production, flares, military clothing, and communication equipment. It is the key element in the creation of tungsten steel and the hardening of lead bullets, two of its most crucial applications during WWII.

Prior to the buildup to the War, the United States was almost entirely dependent on China for its supply of antimony. When that supply was cut off by Japan, America had to find another source of this key mineral. Fortunately for the U.S. at that time, a gold mine in central Idaho called the Stibnite mine was able to step up production of the antimony that is an element in the mine's ore and helped fill the void.

The Stibnite mine ended up producing fully 90% of America's demand for antimony for the duration of the War and was key to producing 40% of the tungsten steel needed for the military effort. Following the War, output from the Stibnite mine gradually declined, and its operations were shut down entirely in 1997.

Today, the U.S. finds itself once again wholly reliant on other countries for its antimony needs, most heavily China and to a lesser extent, Russia. As Christopher Ecclestone, Mining Strategist at London-based Hallgarten & Company, said during a webinar this week, as recently as a few years ago, China produced as much as 80% of the world's supply of antimony. But years of over-production of its key mines, along with lingering low commodity prices have reduced China's share of global production to 53%.



Critical mineral antimony global supply sources.

PERPETUA RESOURCES

However, several large producing nations ship their supplies to China for processing, meaning that the communist empire still processes 80% of global supply, and thus commands its ultimate supply chain. Ecclestone said he believes Chinese supply is in rapid decline, and that the Chinese government is currently rationing its own production. This helps to explain a recent spike in the price for the metal, which has doubled over the last 6 months.

Worse, Ecclestone believes that global demand for antimony in the coming years “cannot be met from current supplies.” If true, this will impact all of us in a variety of ways, because antimony is a crucial element in far more than just military applications.

For example, consider its usage in the high-tech sector, where it is a key ingredient in semi-conductors, circuit boards, electric switches, fluorescent lighting, high quality clear glass and lithium-ion batteries. No antimony, no iPhones. No hi-definition TVs. No modern kitchen appliances, all of which

make use of digital circuitry. Oh, and that car you're thinking about buying? Sorry.

Now, consider this: There can be no "energy transition" without adequate supplies of antimony. That thick, heavy glass used in solar panels? It's made with antimony. Those 300 to 700 foot-tall windmills that sporadically produce electricity? Made with antimony. Antimony is a key element in the manufacture of lithium-ion batteries, as mentioned above, but even more crucial is the fact that it is integral to the development of the next-generation liquid metal batteries that, as Ecclestone pointed out during the webinar, hold the key to truly scalable energy storage for wind and solar power.

Although Tesla CEO Elon Musk touts his company's lithium-ion technology as that key, Ecclestone disagrees, mainly because lithium-ion batteries rapidly lose their charge, especially in unusually cold or hot temperatures. Liquid metal batteries are able to hold the charge put into them over much longer periods of time and are far less impacted by severe temperatures. Thus, the development of this technology is key to the "energy transition" ever really taking place, and that cannot happen without a reliable and ample supply of antimony. As tensions between the U.S. and China continue rising, so do concerns about the ultimate source of that supply.

Obviously, the U.S. needs to develop a domestic supply of this critical mineral, but where will it come from? Ironically, the only potential domestic source of the metal currently being considered for development happens to be the very same Stibnite mine that served such a vital role during World War II.

There remains much gold to be mined at the Stibnite site, and that means a great deal of antimony to be mined along with it. Perpetua Resources, a company created a decade ago to restart production at Stibnite, is optimistic it

can recover this critical resource over a period of about 12 years, and ultimately clean up and restore the area it occupies to pristine condition.

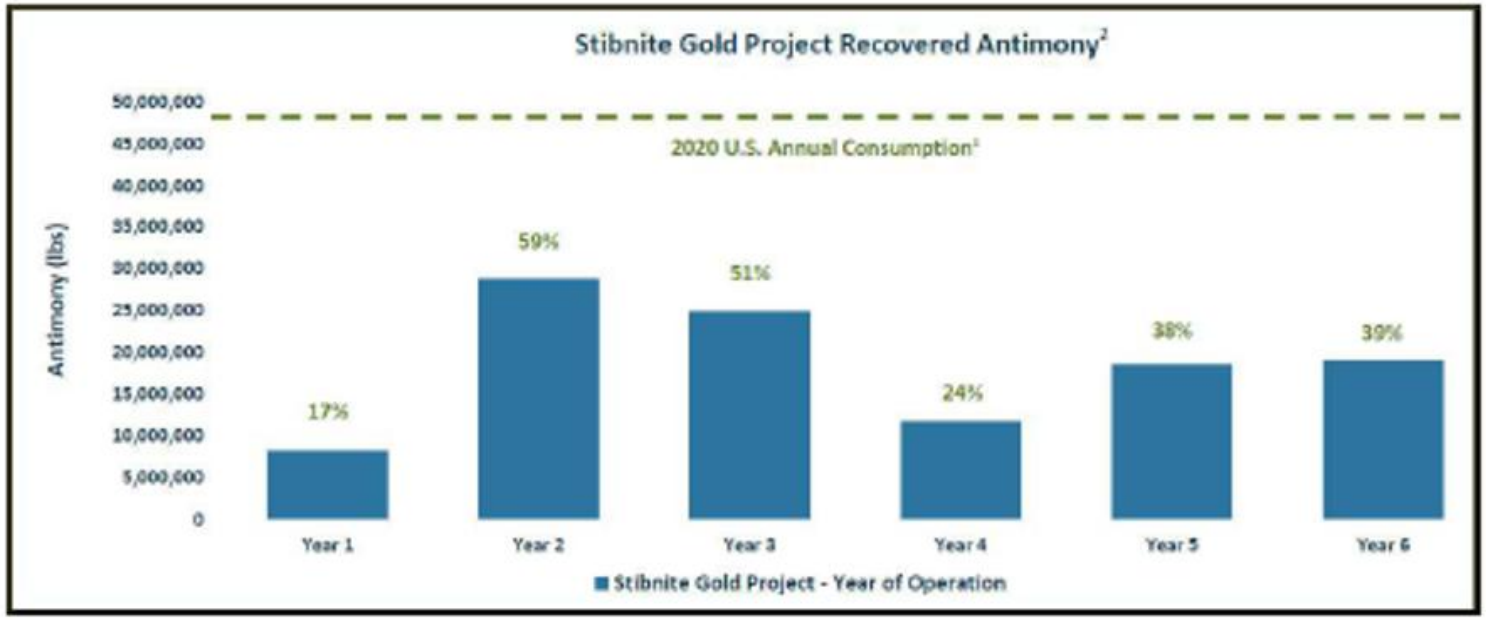
The company has spent the last decade in the planning phase of the project, and is currently seeking approvals from the U.S. Forest Service under the National Environmental Policy Act (NEPA).

Assuming the NEPA effort meets with success, Perpetua will spend up to a year seeking as many as 50 separate required permits, licenses, approvals and authorizations from federal, state and local regulatory bodies before work can finally begin on the project itself. If all goes as currently planned, the company tells me it anticipates first production of gold and antimony from the mine in the 2025-2026 time frame.

Notably, this project is considered one of the largest resources of antimony outside of the control of China, Russia and their allies. Perpetua anticipates a 12-year production time frame related to the currently known resource present at the mine site, and believes it will be able to produce, on average, about 35% of current U.S. antimony usage over the first six years of production. As you can see from the chart below, that does not include anticipated increased domestic antimony demand from the development of next-generation battery technology.

Potential supply of U.S. annual consumption from the Stibnite mine.

The table below shows just how important this could be with a meaningful proportion of US needs being satisfied over the next decade by the Stibnite mine:



It should be noted that the mooted US consumption figure (based on USGS data) is a flatline and thus does not calculate in any growth form current applications and includes nothing for the potential demand from molten salt battery applications.

These percentages could increase should Perpetua discover additional reserves of gold and antimony as it goes through the mining process, a prospect the company considers to be entirely likely.

In 1977, then-President Jimmy Carter declared the fact that the United States was 33% dependent on imports of foreign oil to meet its needs to be a national emergency. In light of that, it seems almost unbelievable that this country has allowed itself to become almost 100% dependent on imports of a metal integral to so many applications as antimony. Of course, the U.S. is also in a similar situation related to better-known critical minerals like lithium and cobalt, which are also key to the production of solar panels, wind turbines and lithium-ion batteries.

Given all the ongoing hype about renewable energy, electric vehicles and the seeming urgency around moving to them in the coming few decades, this seems a very odd way to manage such a massive envisioned “energy transition.” If that goal is to ever truly become reality in the U.S., the country must find a way to secure adequate supplies of these minerals by exploiting its own domestic reserves of them. Where antimony is concerned, Perpetua Resources at least has a plan to make a good start.